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## Executive Summary

The Federal Radionavigation Plan (FRP) is prepared as required by 10 U.S.C. 2281(c) and delineates policies and plans for Federally provided radionavigation systems. It also recognizes that the existence of privately operated radiodetermination systems may impact future government radionavigation planning. This plan describes the authorities and responsibilities of Federal agencies and describes the management structure established to guide individual operating agencies in defining and meeting radionavigation requirements in a cost-effective manner. It is the official source of radionavigation policy and planning for the Federal Government. This edition of the FRP updates and replaces the 1996 FRP and covers common-use radionavigation systems (i.e., systems used by both civil and military sectors) that are covered in the Department of Defense (DOD) Chairman, Joint Chiefs of Staff (CJCS) Master Positioning, Navigation, and Timing Plan (MPNTP). The FRP does not cover radionavigation systems used exclusively by the military.

This document describes the various phases of navigation and other applications of radionavigation services, and provides current and anticipated requirements for each. As requirements change, radionavigation systems may be added or deleted in subsequent revisions to this plan. Where there is a potential for radio spectrum currently supporting these radionavigation systems to be used for implementation of new aeronautical systems, these have been identified within the text of the FRP.

The FRP covers common-use, Federally operated systems. These systems are sometimes used in combination or with other systems. Privately operated systems are included in order to provide a complete picture of U.S. radionavigation. The plan does not include systems which mainly perform surveillance and communication functions.

The Federally provided systems covered in this plan are:

- GPS
- Augmentations to GPS
- Loran-C
- VOR and VOR/DME
- TACAN
- ILS
- MLS
- Radiobeacons

Major goals of DOD and the Department of Transportation (DOT) are to ensure that a mix of common-use (civil and military) systems is available to meet user requirements for accuracy, reliability, availability, integrity, coverage, operational utility, and cost; to provide adequate capability for future growth; and to eliminate unnecessary duplication of services. Selecting a future radionavigation systems mix is a complex task, since user requirements vary widely and change with time. While all users require services that are safe, readily available and easy to use, the military has more stringent requirements including performance under intentional interference, operations in high-performance vehicles, worldwide coverage, and operational capability in severe environmental conditions. Cost is always a major consideration which must be balanced with a needed operational capability.

Navigation requirements range from those for small single-engine aircraft or small vessels, which are cost-sensitive and may require only minimal capability, to those for highly sophisticated users, such as airlines, large vessel operators, or spacecraft, to whom accuracy, flexibility, and availability may be more important than initial cost. The emerging applications of land navigation will most likely cover the entire range of requirements. The selection of an optimum mix to satisfy user needs, while holding the number of systems and costs to a minimum, involves complex operational, technical, institutional, international and economic tradeoffs. This plan establishes a means to address user inputs and questions, and arrive at an optimum mix determination. This edition of the FRP builds on the foundation laid by previous editions and further develops national plans toward providing an optimum mix of radionavigation systems. The constantly changing radionavigation user profile and rapid advancements in systems technology require that the FRP remain as dynamic as the issues it addresses.

This document is composed of the following sections:

**Section 1 - Introduction to the Federal Radionavigation Plan:** Delineates the purpose, scope and objectives of the plan and describes the DOD and DOT policies and plans for the radionavigation system mix.

**Section 2 - Radionavigation System User Requirements:** Provides civil and military requirements for air, space, land, and marine navigation, and non-navigation applications of radionavigation systems.

**Section 3 - Radionavigation System Use:** Describes how the various radionavigation systems are used in meeting civil and military requirements, and the status and plans for each system.

**Section 4 - Radionavigation System Research and Development Summary:** Presents the research and development efforts planned and conducted by DOT, DOD, and other Federal organizations.

**Appendix A – U.S. Government Agency Radionavigation Roles and Responsibilities:** Presents the DOD, DOT, and other Federal agency roles and responsibilities for providing radionavigation services.

**Appendix B – Radionavigation Systems Selection Considerations:** Describes the radionavigation system mix in terms of five parameters: operational, technical, economic, institutional, and international.

**Appendix C - System Descriptions:** Describes present and planned navigation systems in terms of ten major parameters: signal characteristics, accuracy, availability, coverage, reliability, fix rate, fix dimensions, system capacity, ambiguity, and integrity.

**Appendix D – Datums and Reference Systems:** Discusses geodetic datums and the reference systems based upon them.

**Appendix E - Definitions**

**Appendix F - Glossary**

**References**

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